ABILITY OF ADULT PATIENTS TO PREDICT ABSENCE OR PRESENCE OF FEVER IN AN EMERGENCY DEPARTMENT TRIAGE CLINIC

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مقدمة: تعتبر درجة الحرارة المرتفعة من أكثر مظاهر المرض التي يمكن قياسها والتي تثير عادة توقعات علاجية عالية. وقد يلتمس المرضى المشورة الطبية لأنهم يعتقدون انهم يعانون من المرض والحرارة المرتفعة، أما إذا كان لديهم شعوراً بأنهم مرضى ولكن دون أن يقترن ذلك بارتفاع في درجة الحرارة فقد لا يلجؤون في هذه الحالة إلى طلب المشورة الطبية. إن ارتفاع درجة الحرارة الذاتية (subjective) قد يعتبر كذلك مؤشراً هاماً لإجراء تقييم إضافي لحالة المريض.

هدف الدراسة: الهدف من هذه الدراسة هو عمل تقييم لمصداقية المرضى البالغين للتنبؤ بغياب أو وجود ارتفاع في درجة الحرارة في عيادة تصنيف الحالات بقسم الطوارئ.

طريقة الدراسة: تم إجراء الدراسة على 1241 مريض من المرضى البالغين القادرين على المشي (الذين تزيد أعمارهم عن 12 سنة) واستمرت الدراسة ثلاث أسابيع. وقد تم سؤال جميع المرضى عما إذا كانوا يعانون أم لا من ارتفاع في درجة الحرارة أو عما لو كانوا يعانون من هذا الشعور أو كان هناك ارتفاع في درجة حرارتهم عندما تم قياس درجة حرارتهم بواسطة جهاز IVAC الرقمي. وقد تم أخذ قياسات درجات الحرارة في مجموعتين وذلك من أجل تحديد الارتفاع الشديد في درجة الحرارة بالنسبة لدرجة الحرارة 37.8 مئوية أو أعلى، ودرجة الحرارة 38 مئوية أو أعلى.

نتائج الدراسة: كانت حساسية ونوعية الاستبيان عن ارتفاع درجة الحرارة بالطريقة الذاتية 89.6% و 94.5% بالنسبة للرجال و90% و94.8% بالنسبة للسيدات. كان معدل الدقة 93.9% و 94.6% على التوالي. كانت نسبة عدد حالات ارتفاع درجة الحرارة الموضوعية (objective fever) 8.7% وكانت تحدث مقادير تنبئية إيجابية وسلبية عامة نسبتها 80.9% و 98.9% مع معدل دقة نسبته 94.2%.

الاستنتاجات: وجد أن مصداقية المرضى البالغين، المراجعون لعيادة تصنيف الحالات، في تقييم ارتفاع الحرارة الذاتية (subjective fever) تعتبر جيدة. وجد في الواقع أن نسبة أربعة من بين كل خمسة من المرضى الذين قالوا أن درجة حرارتهم الموضوعية (objective temperature) كانت مرتفعة (38 درجة مئوية أو أكثر). وهذا يعني أن الشكوى من ارتفاع درجة الحرارة الذاتية (subjective temperature) يجب أن تؤخذ بجدية أكثر من قبل الأطباء في مجتمعنا.

الكلمات المرجعية: درجة الحرارة، التوقع ، المصداقية،البالغين ، قسم الطوارئ.

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Introduction: Fever is the most appreciated manifestation of disease which usually raises high therapeutic expectations. Patients seek medical advice because they think they are sick and feverish. If they feel that they are sick but not feverish, they may not seek medical advice. Subjective fever may also be an important clue to further evaluation of the patient.

Objective: The aim of this study was to assess the reliability of adult patients to predict absence or presence of fever in Emergency Department triage clinic.

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Methods: *A prospective study of 1241 ambulatory adult patients (above 12 years of age) was carried out over a three-week period. All patients were asked whether or not they had fever or felt they had fever or were running a temperature before oral temperature was taken with an IVAC digital machine. Two sets of temperature readings were taken to define fever as 37.8^{o}C or greater, and 38.0^{o}C or greater.*

Results: *The sensitivity and specificity of detecting fever by subjective means was 89.6% and 94.5% for male and 90.0% and 94.8% for female. The accuracy rates were 93.9% and 94.6% respectively. The prevalence of objective fever was 8.7% yielding general positive and negative predictive values of 80.9% and 98.9% with an accuracy rate of 94.2%.*

Conclusion: *The reliability of adult patients attending triage clinic in assessing subjective fever was found to be good. Four out of five of our patients who believed they had a fever were actually found to have an objective temperature increase (38.0^{o}C or greater). This means that medical staff should take a complaint of subjective fever in our population more seriously.*

Key Words: *Fever, subjective fever, adult patient, emergency department and reliability*

INTRODUCTION

Fever is the most appreciated manifestation of disease.[1] Although nonspecific, it may indicate the presence of a spectrum of illnesses ranging from a self-limiting viral syndrome to life-threatening bacterial disease of malignancy.[2] Fever is one of the most frequent complaints encountered in an Emergency Department. People identify fever as a sign of illness more readily than they recognize the importance of most other symptoms.

Patients come to the Emergency Department (ED) because they think they are sick and feverish. If they feel that they are sick but not feverish, they may not come to ED. In addition to causing concern, the presence of fever usually raises high therapeutic expectations.[3] Medical staff may over – or underestimate the patient's complaint of fever. Overestimation of subjective fever by medical staff, even if not proven on examination, may influence them to order unnecessary investigations or medications.[4]

As some of the endemic diseases such as malaria, brucellosis and Tuberculosis (TB) prevalent in our area may present early as intermittent fever, the patient may feel feverish at night or at some point but be afebrile on presentation at the ED. Fever in elderly persons even in the absence of other manifestations of disease, may indicate the presence of serious infection, most often caused by bacteria or a non-infectious disease; such as connective tissue disorders or a malignancy.[5]

Subjective fever may, therefore, be an important clue for further evaluation of the patient. It is therefore important that the patients' ability to detect the presence or absence of fever be better characterized.

Since the reliability of patients in Saudi Arabia to predict absence or presence of fever has not been studied before, the objective of this study is to assess the reliability of subjective fever in triage of adult patients in the ED and to compare their assessment with temperature measurement on the IVAC digital machine.

METHODS

A prospective study was carried out over a three-week period on all ambulatory adult patients (above 12 years of age) of both genders, attending a triage clinic in the ED of King Fahd Hospital of the University in Al-Khobar, Saudi Arabia. This is a 440-bed hospital with 130,000 patient visits to the ED per year. Injured and trauma patients, those with a respiratory rate above 30 per minute, those with altered mental status and all patients attending obstetric and gynecology triage room were excluded from the study. The physician in the triage room asked each patient whether or not he or she had fever or felt feverish before oral temperature was taken with the IVAC digital machine.

Two sets of temperature readings were taken to define fever as 37.8^oC or greater and 38.0^oC or greater. The clinical diagnosis of the patient's complaints was also recorded and grouped by gender for 996 patients.

A single standard 2x2 table was constructed according to the patient's subjective sensation of fever and the measured oral temperature. Sensitivity, specificity and positive and negative predictive values with 95% confidence intervals (95% CI) were calculated.

Data was entered into a personal computer using SPSS/PC version 6.0 statistical package. The method of chi-square was applied to calculate significant and non-significant values.

RESULTS

The total number of adult patients in this study was 1241 patients, 540 (43.5%) males and 701 (56.5%) females. The mean age (± SD) of males was 30.75 ± 14.1 years and the mean age of females was, 32.9 ± 13.6 years.

The sensitivity of male and female patient detection of fever by subjective means was 89.6% and 90.0% respectively, while the specificity was 94.5% and 94.8% respectively (Table 1). The accuracy rates were 93.9% and 94.6% respectively (Table 2).

The positive predictive value (PPV) and negative predictive value (NPV) with 95% CI for male patients was 69.8% (63.5 - 76.1) and 98.5% (97.5 – 99.6) and for the female patients was 52.1% (36.8 – 67.4) and 99.4% (98.6 – 99.9) respectively.

The prevalence of objective fever was 8.7% yielding general positive and negative predictive values of 80.9% and 98.9% with an accuracy rate of 94.2% (Table 2).

Other calculations were made when fever was defined as a temperature of 37.8^oC or above. Table 2 shows sensitivity, specificity, positive and negative predictive values and accuracy rate in subjectively predicting objective oral temperature of 37.8^oC or greater in comparison with temperature of 38.0^oC or greater. The clinical diagnoses according to gender for 996 patients are illustrated in Table 3.

Table 1: *Sensitivity and specificity of adult patients in subjectively predicting oral temperature increase*

Category	Sensitivity	95% CI	Specificity	95% CI	X2	p-value
Males $\geq 38.0^oC$	89.6%	82.3 – 96.9%	94.5%	92.5 – 96.5%	309.67	< .00001
Males $\geq 37.8^oC$	83.3%	75.3 – 91.3%	96.5%	94.8 – 98.2%	337.56	< .00001
Females $\geq 38.0^oC$	90.2%	81.2 – 99.2%	94.8%	93.2 – 96.4%	297.78	< .00001
Females $\geq 37.8^oC$	79.7%	69.4 – 90.0%	96.3%	78.2 – 81.2%	342.18	<.00001

Table 2: *Sensitivity, specificity, positive predictive value, negative predictive value and accuracy rate of ability of adult patients to subjectively predict objective oral temperature increase*

Category	True Sensitivity (+ve's)	True Specificity (-ve's)	No. (PPV)	No. (NPV)	No. (Accuracy Rate)
Male ≥ 38°C (540)	67 (89.6%)	473 (94.5%)	86 (69.8%)	454 (98.5%)	540 (93.9%)
Male ≥ 37.8°C (540)	84 (83.3%)	456 (96.5%)	86 (81.4%)	454 (96.9%)	540 (94.4%)
Female ≥ 38°C (701)	41 (90.2%)	660 (94.8%)	71 (52.1%)	630 (99.4%)	701 (94.6%)
Female ≥ 37.8°C (701)	59 (79.7%)	642 (96.2%)	71 (66.2%)	630 (98.1%)	701 (94.9%)
Cum. ≥ 38°C (1241)	108 (89.9%)	1133 (94.7%)	157 (80.9%)	1084 (98.8%)	1241 (94.2%)
Cum. ≥ 37.8oC (1241)	143 (81.5%)	1098 (96.4%)	157 (73.8%)	1084 (97.5%)	1241 (95.4%)

Table 3: *Clinical diagnoses for 996 adult patients seen in Emergency Department according to their gender*

Diagnosis	Female (%)	Male (%)	Total (%)	p-value (X^2)
Cardiovascular	37 (5.6)	10 (3.0)	47 (4.7)	0.0208
Respiratory	33 (5.0)	17 (5.1)	50 (5.0)	0.9204
Gastrointestinal	102 (15.5)	32 (9.5)	134 (13.5)	0.0064
Hematology/Oncology	24 (3.6)	10 (3.0)	34 (3.4)	0.4066
Endocrinology	11 (1.7)	3 (0.9)	14 (1.4)	0.1870
Genitourinary	51 (7.7)	31 (9.2)	82 (8.2)	0.6030
Musculoskeletal	104 (15.8)	62 (18.5)	166 (16.7)	0.1336
Neurologic	34 (5.2)	13 (3.9)	47 (4.7)	0.4654
Dermatological	19 (2.9)	2 (0.6)	21 (2.1)	0.0188
Ophthalmologic	9 (1.4)	8 (2.3)	17 (1.7)	0.3422
Ear, Nose and Throat	119 (18.0)	74 (22.0)	193 (19.4)	0.1388
Psychiatric	19 (2.9)	6 (1.8)	25 (2.5)	0.2628
Infectious Disease	4 (0.6)	4 (1.2)	8 (0.8)	0.3682
Trauma and Injury	50 (7.6)	43 (12.8)	93 (9.3)	0.0124
Others	44 (6.7)	21 (6.3)	65 (6.5)	0.8104
Total	**660 (66.3)**	**336 (33.7)**	**996 (100)**	**0.0078**

DISCUSSION

The normal body core temperature ranges between 36.2°C and 37.8°C and is influenced by several factors: age (infants less than one year have higher baseline temperature), times of day (temperature generally elevates in the afternoon), exercise, metabolic rate, environmental temperature and bundling. Fever is generally, albeit arbitrarily, considered as a rectal temperature of 38.0°C or greater.[2]

Usually, documentation of actual recording of elevated temperature is required before a patient is considered feverish and further

action taken. Nevertheless, a history of subjective fever may influence the differential diagnosis and the plan of action drawn by the treating physicians.

In this study, the reliability of our adult patients attending triage clinic in assessing subjective fever was tested. Their ability to predict the presence or absence of an objective fever of 38.0°C or greater was found to be good.

The ability of our patients to predict the presence or absence of an objective fever seems to be better than the US patients studied by Buckley.[4] The sensitivity and specificity in US patients were 83% each, while in our study, the sensitivity and specificity were 89.9% and 94.7% respectively.

The denials of subjective fever by the patient in our study and Buckley's study[4] were almost the same, where it was highly predictive of not having an objective increase in oral temperature (NPV 98.9% and 99.0% respectively).

On the other hand, the PPV of the complaints of subjective fever was only 25.0% in Buckley's[4] study compared to 80.9% in our study. This means, four out of five of our patients who believed they had a fever were actually found to have objective temperature increase, compared to one out of four patients in Buckley's[4] study. Medical staff should therefore, take the complaint of subjective fever in our population more seriously.

The results of our study showed that the ability of females to predict presence or absence of subjective fever (38°C or greater) is higher than males (92.1% for females and 69.8% for males). This could be explained by the fact that women make better nurses then men. On the other hand, further investigation may be required on this difference.

When the set of definition of an objective fever is put at 37.8°C or above,

the sensitivity and PPV of the ability of the patient to predict presence or absence of fever drops from 89.9% and 80.9% to 81.4% and 73.8% respectively and the specificity increases from 94.7% to 96.4%. Though the difference in objective temperature between the two readings was only 0.2°C it is still statistically significant (p-value <0.01).

The clinical diagnosis of 996 adult patients out of the whole sample was recorded as seen in Table 3. The written diagnoses indicate the diagnosis of the current encounter for this particular visit to ED.

Ear, Nose and Throat (ENT) and Musculoskeletal problems were the most frequent presentations encountered in the triage clinic (19.4% and 16.7% respectively). Since this study was carried out towards the end of June and early July, the high presentation of both diagnoses cannot be attributed to cold weather or winter viral illnesses.

There were significant differences between male and female in the overall clinical diagnoses (chi = 29.92 p-value = 0.0078). More female patients presented with Cardiovascular and Gastrointestinal diseases than the male patients (p-value = 0.0208 and 0.0069 respectively). On the other hand, more males presented with Dermatological disease, Trauma and Injury than females (p-value = 0.0188 and 0.0124 respectively).

These differences may be due to the fact that males in our community at work or at leisure are more exposed than females to the risk of contact with different chemical and allergic agents, to trauma and injury.

In conclusion, this study showed that adult patients were reasonably reliable in their assessment of subjective fever. Four out of five of those who stated that they had fever were correct. Females were more accurate in this regard than males. Therefore, medical staff should take the complaints of subjective fever in our community more seriously.

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